

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 30 January 2001 (30.01.01)	
International application No. PCT/EP00/02747	Applicant's or agent's file reference 10122WO
International filing date (day/month/year) 02 March 2000 (02.03.00)	Priority date (day/month/year) 16 March 1999 (16.03.99)
Applicant ROBERT, Bernard et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 11 October 2000 (11.10.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer R. E. Stoffel Telephone No.: (41-22) 338.83.38
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WRITTEN OPINION

International application No. PCT/EP00/02747

I. Basis of the opinion

1. This opinion has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".)*:

Description, pages:

1-13 as originally filed

Claims, No.:

1-14 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINIONInternational application No. PCT/EP00/02747

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(II) with regard to novelty, Inventive step or Industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1,7
Inventive step (IS)	Claims	2,3,5,6,8-14
Industrial applicability (IA)	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the International application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/EP00/02747

Section V.

- 1 US-A-5 345 527 discloses an optoelectronic connector comprising
 - a a "package" (housing 127, Fig. 4) having an optical port (132) and an electrical "port" (140),
 - b an optoelectronic circuit (150, Fig. 6) positioned in the package and connected and/or coupled to the two ports, wherein
 - c the optoelectronic circuit (150) comprises a "bare" control and emission-detection integrated circuit chip (i.e. just the integrated circuit 150 and no extra or auxiliary chips),
 - d an internal wall of the package being provided with metallized connections (see Fig. 4), pads of the integrated circuit being connected directly to the metallized connections,
 - e laser diodes being "transferred on" the integrated circuit (see col. 6, lines 56 & 57 which refer to the chip being formed on or transferred to the integrated chip), the connector constituting a "basic unit link" (i.e. the transmitter portion of a transmitter/receiver link).

Hence, each feature of claim 1 has a counterpart in the citation and the present application does not therefore meet the requirements of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

- 2 Claim 2 does not appear to add any inventive matter since it is clear from the Figures of US-A-5 345 527 that the space between the diodes is equal to the space between the optical fibre ends.

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/EP00/02747

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- 3 As for claims 3, 5 & 6 it would be clear to a skilled person the "metallized" housing of the connector of US-A-5 345 527 could be formed as a known type of package, such as a MID type package with appropriate BGA type connections and shielding (e.g. see WO-A-9609646 which teaches the use of such "packages" with integrated circuit chips).
- 4 It is not clear what is meant in claim 4 by "a method with metallizations in two passes" and how such a method would produce a "package" with physical features that distinguish it from known prior art "packages".
- 6 Claim 7 repeats features already claimed in claim 1.
- 7 As for claim 8 the photonic components of US-A-5 345 527 are coupled to the fiber ends by way of waveguides, the respective light beams traveling along straight paths. But it would be clear to a skilled person that VCSEL diodes with an appropriately modified light path could be used as is known in the art - see US-A-5 781 682. US-A-5 781 682 involves a light path which is turned through 90° by a curved reflective surface; however, it would be evident to a skilled person that a simple 45°-inclined mirror would also be suitable for such a task (cf. claim 9).
- 8 It is known in the art to use sloping surfaces to position the ends of optical fibers (cf. claim 10).
- 9 Claims 11, 13 & 14 recite obvious and/or known design options for connectors in this art.

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/EP00/02747

- 10 The flat rectangular prismatic shape of the connector of US-A-5 345 527 enables such connectors to be stacked in a pile (cf. claim 12).

Section VII.

It is appropriate to draft the independent in the two-part form as required by Rule 29(1) EPC.

The description should be brought into conformity with any amended claims as required by Rule 5.1(a)(iii) PCT.

Section VIII.

The description of the prior art is not clear in pages 2 - 5 and should be revised clearly to distinguish what is prior art from what are embodiments of the invention.

Response to written Opinion

39/936951

JC03 Rec'd PCT/PTO 17 SEP 2001

OBSERVATIONS

After consideration of the documents cited in the International Search Report, we have modified claim 1 as follows. The claimed invention is protecting an optoelectronic connector comprising a package comprising an optical port, an electrical port, and a bare control and emission-detection integrated circuit chip. The integrated circuit chip is directly connected to metallized connections made in an internal wall of the package of the connector. More specifically, the object of the invention is an optoelectronic connector comprising laser diodes being transferred on the integrated circuit. Those diodes don't need any self and independent substrate. Here, the fact that diodes are transferred on the integrated circuit means that they "are placed directly on" the integrated circuit, that they "are not directly implanted in the integrated circuit". They are moved on to the integrated circuit, while mounting of the connector. They are then presented on the integrated circuit, and not on a substrate of printed circuit board type, neither on a connector's package type. In one example for using such a thin layer transfer technique, process described page 11 line 8 - page 12 line 4 is used.

An advantageous object of the invention is to present an higher miniaturisation optoelectronic connectors (Page 1, line 27, "With a view to miniaturisation"). In conformity with R5.1 (a) (iii) PCT, the problem solved by the invention is clearly explained. And problems raised by the prior art are clearly explained (Page 4, lines 4-5 "this type of approach is not compatible with desired goals of miniaturisation"). Moreover the prior art is enough described from page 1 line 21 to page 4 line 10.

Document US-5,345,527, D1, cited by the examiner for destroying novelty of the invention doesn't describe all of the characteristics of the claimed invention. Indeed, even if this document describes an optoelectronic connector foreseen for receiving optical fibres in front of photonic components, for example diodes, this document doesn't teach to present the diodes on the integrated circuit itself. A solution of this document is only to directly connect by wire bounding those diodes with the integrated circuit, both being placed on different substrates.

Then the invention is new compared to D1.

Moreover, D1 teaches realisation of optoelectronic connector imposing a waveguide between photonic components and optical fibres. But it's an objet of the invention to suppress waveguide by proposing a space between diodes equal to the space between optical fibres without the intermediary of such waveguides. In the invention, geometry of optical port guaranties a correct position of the optical fibres in front of the diodes.

Document US-A-5,781,682, D2, describes an optoelectronic connector. But on one hand diodes are not "transferred on the integrated circuit ", they are simply connected together by wire bounding. Moreover, the package of this connector doesn't comprise, like in the invention, " being provided with metallized connections connected directly to the pads of this integrated circuit ". Then the invention is new compared to D2.

Document EP-A-0 305 112, D3, an otoelectronic connector foreseen to receive an optical fibre. This connector comprises, in a package, a substrate on which chips are directly mounted, each of the chip being presented inside an insulating body. This insulating body allowing each chip to be manipulated. But contrary to the invention, D3 doesn't teach an integrated circuit on which diodes are transferred. Then the invention is new compared to D3.

Abstract of document JP-A-07146423, D4, signals an assembly comprising an optical integrated circuit. But this document doesn't teach that diodes of this printed circuit are transferred on the integrated circuit. Then the invention is new compared to D4.

Document US-A-3,963,920, D5, describes a printed circuit board comprising an opening through which a different resin substrate is mounted. This resin substrate is supporting diodes. Moreover, the board comprises other zones where chips are mounted. But contrary to the invention, diodes are not transferred on (the chips of) integrated circuit ". Then the invention is new compared to D5.

Abstract of document JP-A-58210647, D6, signals an hybrid integrated circuit comprising a photo element. But D6 doesn't teach that this photo element "is transferred on the integrated circuit". Then the invention is new compared to D6.

As well documents EP-A-0893 861 identified D7, EP-A-0864893 identified D8, et WO-A-96/09646 identified D9, describe optoelectronic

connectors which are not teaching like in the invention to transfer the diodes on their respective integrated circuit. Indeed, diodes according to those documents are mounted on a common substrate on which integrated circuits may also be mounted. Then the invention is new compared to D7, D8 and

5 D9.

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PCT REQUEST

- 10122WO

Original (for SUBMISSION) - printed on 02.03.2000 09:59:10 AM

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4 0-4-1	Form - PCT/RO/101 PCT Request Prepared using	PCT-EASY Version 2.90 (updated 15.12.1999)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	European Patent Office (EPO) (RO/EP)
0-7	Applicant's or agent's file reference	10122WO
I	Title of invention	MODULAR OPTOELECTRONIC CONNECTOR
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	FRAMATOME CONNECTORS INTERNATIONAL
II-5	Address:	Tour FRAMATOME 1 Place de la Coupole F-92400 COURBEVOIE France
II-6	State of nationality	FR
II-7	State of residence	FR
II-8	Telephone No.	01 47 96 56 10
II-9	Facsimile No.	01 47 96 54 44
III-1	Applicant and/or Inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	ROBERT, Bernard
III-1-5	Address:	3, rue du Gros Tilleul F-25300 PONTARLIER France
III-1-6	State of nationality	FR
III-1-7	State of residence	FR

2/4

PCT REQUEST

10122WO

Original (for SUBMISSION) - printed on 02.03.2000 09:59:10 AM

III-2	Applicant and/or inventor	
III-2-1	This person is:	applicant and inventor
III-2-2	Applicant for	US only
III-2-4	Name (LAST, First)	ZINDINE, Mostafa, El
III-2-5	Address:	36, rue Robert Desnos F-72100 LE MANS France
III-2-6	State of nationality	FR
III-2-7	State of residence	FR
III-3	Applicant and/or inventor	
III-3-1	This person is:	applicant and inventor
III-3-2	Applicant for	US only
III-3-4	Name (LAST, First)	BRICE, Bernard
III-3-5	Address:	2, rue Marceau F-92300 LEVALLOIS PERRET France
III-3-6	State of nationality	FR
III-3-7	State of residence	FR
IV-1	Agent or common representative; or address for correspondence	
	The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	SCHMIT, Christian, Norbert, Marie
IV-1-2	Address:	Cabinet Christian SCHMIT et Associés 8, place du Ponceau F-95000 CERGY France
IV-1-3	Telephone No.	01 30 73 84 14
IV-1-4	Facsimile No.	01 30 73 84 49
IV-1-5	e-mail	christian.schmit@wanadoo.fr
V	Designation of States	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	CA CN JP KR SG US

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PCT REQUEST

10122WO

Original (for SUBMISSION) - printed on 02.03.2000 09:59:10 AM

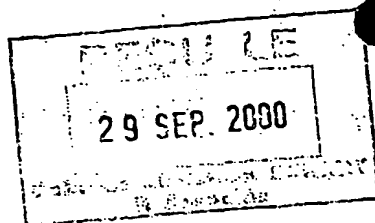
VIII	Check list	number of sheets	electronic file(s) attached
VIII-1	Request	4	-
VIII-2	Description	13	-
VIII-3	Claims	2	-
VIII-4	Abstract	1	10122wo.txt
VIII-5	Drawings	2	-
VIII-7	TOTAL	22	
Accompanying Items		paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-18	Figure of the drawings which should accompany the abstract	1	
VIII-19	Language of filing of the International application	English	
IX-1	Signature of applicant or agent		
IX-1-1	Name (LAST, First)	SCHMIT, Christian, Norbert, Marie	

FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported International application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/EP
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
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PATENT COOPERATION TREATY

PCT

NOTICE INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

SCHMIT, Christian, Norbert, Marie
Cabinet Christian Schmit et

Associés

8, place du Ponceau

F-95000 Cergy

FRANCE

SeH
16/10/2000
16/11/2000
AJ6

Date of mailing (day/month/year) 21 September 2000 (21.09.00)		IMPORTANT NOTICE	
Applicant's or agent's file reference 10122WO			
International application No. PCT/EP00/02747	International filing date (day/month/year) 02 March 2000 (02.03.00)	Priority date (day/month/year) 16 March 1999 (16.03.99)	
Applicant FRAMATOME CONNECTORS INTERNATIONAL et al			

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:

KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

CA,CN,EP,JP,SG

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 21 September 2000 (21.09.00) under No. WO 00/55665

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 18-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 September 2000 (21.09.2000)

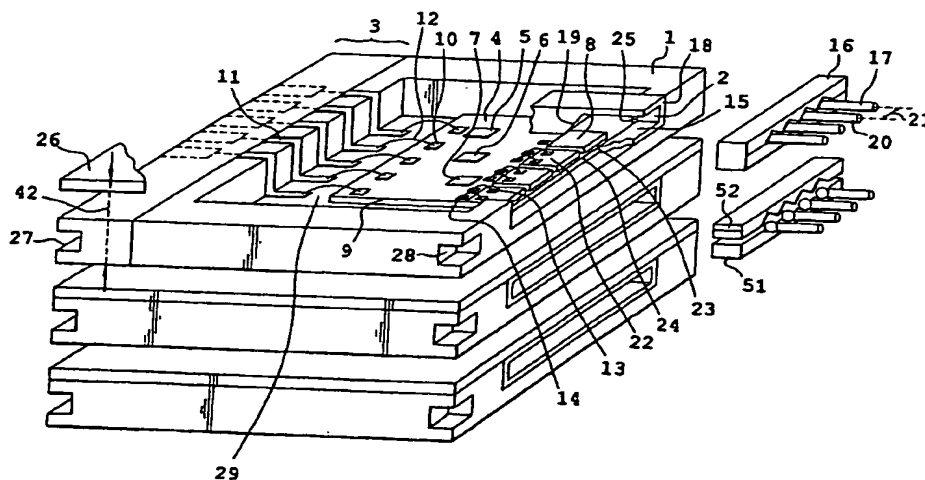
PCT

(10) International Publication Number
WO 00/55665 A3

- (51) International Patent Classification⁷: G02B 6/42, H01L 21/60, H01R 13/658 [FR/FR]; 3, rue du Gros Tilleul, F-25300 Pontarlier (FR). ZINDINE, Mostafa, EI [FR/FR]; 36, rue Robert Desnos, F-72100 Le Mans (FR). BRICE, Bernard [FR/FR]; 2, rue Marceau, F-92300 Levallois Perret (FR).
- (21) International Application Number: PCT/EP00/02747
- (22) International Filing Date: 2 March 2000 (02.03.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
99/03226 16 March 1999 (16.03.1999) FR
99/03222 16 March 1999 (16.03.1999) FR
99/03224 16 March 1999 (16.03.1999) FR
- (71) Applicant (for all designated States except US): FRAM-ATOME CONNECTORS INTERNATIONAL [FR/FR]; Tour Framatome, 1, place de la Coupole, F-92400 Courbevoie (FR).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): ROBERT, Bernard
- (74) Agent: SCHMIT, Christian, Norbert, Marie; Cabinet Christian Schmit et Associés, 8, place du Ponceau, F-95000 Cergy (FR).
- (81) Designated States (national): CA, CN, JP, KR, SG, US.
- (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- Published:
— With international search report.
- (88) Date of publication of the international search report: 28 December 2000

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MODULAR OPTOELECTRONIC CONNECTOR



(57) Abstract: To resolve the problems of the manufacturing costs of an optoelectronic connector, and optoelectronic coupling integrated circuit chip (4) is mounted directly (12) into a package (1) of the connector. This package has an internal shielding metallization and metallizations (11) connected by microconnection techniques to pads (10) of the integrated circuit. The integrated circuit has laser diodes (8) on its surface also connected (13) to the pads (14) of this integrated circuit. These laser diodes are spaced out with respect to one another by a distance corresponding to a distance (21) between the optical fiber terminations (17, 20) in a standardized optical connector (16). The number of elements of the connector is reduced whereas, at the same time, its efficiency in terms of electrical consumption and in terms of transmission quality of a signal is improved.

WO 00/55665 A3

REV. 1.1.1.1
ART 34 ABUT

14
CLAIMS

1. Optoelectronic connector comprising a package (1), an optical port (2), an electrical port (3), an optoelectronic circuit positioned in this package and connected to these two ports, characterized in that the optoelectronic circuit comprises a bare control (5_7) and emission-detection (8) integrated circuit chip, an internal wall (29) of the package being provided with metallized connections (11), pads (10) of this integrated circuit being connected (12) directly to the metallized connections, laser diodes (8) being transferred on the integrated circuit, this connector constituting a basic unit link.
2. Connector according to claim 1, characterized in that the laser diodes (8) are transferred (45) on the integrated circuit with a space (50) between these diodes equal to a space (21) between optical fiber terminations in the optical port.
3. Connector according to one of the claims 1 to 2, characterized in that the package is an MID type package with connection metallizations deposited in a cavity of this package, contact shieldings of the electrical port of this connector being formed by one of these metallizations.
4. Connector according to claim 3, characterized in that the MID type package is made by means of a method with metallizations in two passes.
5. Connector according to one of the claims 3 to 4, characterized in that the package is connected to the integrated circuit by BGA type connections, wire bonding or anisotropic film technology.
6. Connector according to one of the claims 3 to 5, characterized in that the shielding of the package is of an MID type.
7. Connector according to one of the claims 1 to 6, characterized in that pads (10) of the integrated circuit are connected (12) directly to the metallized connections.
8. Connector according to one of the claims 1 to 7, characterized in that the laser diodes are Vcsel diodes, preferably of the GaAs type.
9. Connector according to one of the claims 1 to 8, characterized in that the optical port comprises an inclined mirror (19), preferably inclined at 45°.
10. Connector according to one of the claims 1 to 9, characterized in

15

that the optical port comprises a part (18) for positioning optical fiber terminations, this part abutting (23) a cant (24) of the integrated circuit.

5 11. Connector according to one of the claims 1 to 10, characterized in that the optical port comprises a limited access with two optical channels and in that the electrical port comprises contacts for electrical signals and contacts for a ground signal.

12. Connector according to one of the claims 1 to 11, characterized in that the package is a module and comprises means (27, 28) to be stacked on another package.

10 13. Connector according to one of the claims 1 to 12, characterized in that pads of the laser diodes are connected by connection wires directly to pads of the integrated circuit.

15 14. Connector according to one of the claims 1 to 13, characterized in that the optoelectronic circuit comprises means to carry out a conversion of the signals available at the optical port into signals available at the electrical port and/or vice versa.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 10122WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP00/02747	International filing date (day/month/year) 02/03/2000	Priority date (day/month/year) 16/03/1999
International Patent Classification (IPC) or national classification and IPC G02B6/42		
Applicant FRAMATOME CONNECTORS INTERNATIONAL et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 11/10/2000	Date of completion of this report 05.07.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Beaven, G Telephone No. +49 89 2399 2581 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/02747

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):
Description, pages:

1-13 as originally filed

Claims, No.:

1-14 as received on 19/05/2001 with letter of 17/05/2001

Drawings, sheets:

1/2,2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

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- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
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4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/02747

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-6,8-14
	No:	Claims	1,7
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-14
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Section V.

- 1 US-A-5 345 527 discloses an optoelectronic connector comprising
 - a a "package" (housing 127, Fig. 4) having an optical port (132) and an electrical "port" (140),
 - b an optoelectronic circuit (150, Fig. 6) positioned in the package and connected and/or coupled to the two ports, wherein
 - c the optoelectronic circuit (150) comprises a "bare" control and emission-detection integrated circuit chip (i.e. just the integrated circuit 150 and no extra or auxiliary chips),
 - d an internal wall of the package being provided with metallized connections (see Fig. 4), pads of the integrated circuit being connected directly to the metallized connections,
 - e laser diodes being "transferred on" the integrated circuit (see col. 6, lines 56 & 57 which implicitly refer to the chip being formed on or transferred to the integrated chip instead of being located somewhere else), the connector constituting a "basic unit link" (i.e. the transmitter portion of a transmitter/receiver link).

Hence, each feature of claim 1 has a counterpart in the citation and the present application does not therefore meet the requirements of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

(Nb: With regard to the above objection, the expression "laser diodes being "transferred on" the integrated circuit " is somewhat vague (Art. 6). Even though the description refers to a thin film transfer technique, the present of claim 1 wording covers other interpretations: e.g. such as meaning simply moving the diode from one place to another. Moreover, it is also not clear that the result of applying a thin film transfer technique would anyway result in an integrated circuit having a laser diode that physically differs from an integrated circuit produced by

some other technique.)

- 1.1 If claim 1 were to be limited somehow to the laser diode being formed on the integrated circuit by a thin film transfer technique, then such a claim would not appear to be inventive. It is already known in the art to use such techniques for diodes [e.g. see EP-A-858 110 (col. 18, line 24); WO-A-98/02921 (page 9, line 27); and EP-A-924 769 (col. 16, lines 32 & 33), later family member of WO-A-99/01899, copies enclosed] and a skilled person would realise that such a thin film transfer technique could be used in US-a-5 345 527 (which, as mentioned above, refers to forming the photonic components directly on the IC chip).
- 2 Claim 2 does not appear to add any inventive matter since it is clear from the Figures of US-a-5 345 527 that the space between the diodes is equal to the space between the optical fibre ends.
- 3 As for claims 3, 5 & 6 it would be clear to a skilled person the "metallized" housing of the connector of US-a-5 345 527 could be formed as a known type of package, such as a MID type package with appropriate BGA type connections and shielding (e.g. see WO-a-9609646 which teaches the use of such "packages" with integrated circuit chips).
- 4 It is not clear what is meant in claim 4 by "a method with metallizations in two passes" and how such a method would produce a "package" with physical features that distinguish it from known prior art "packages".
- 6 Claim 7 repeats features already claimed in claim 1.
- 7 As for claim 8 the photonic components of US-a-5 345 527 are coupled to the fibre ends by way of waveguides, the respective light beams travelling along

straight paths. But it would be clear to a skilled person that VCSEL diodes with an appropriately modified light path could be used as is known in the art - see US-a-5 781 682. US-a- 5 781 682 involves a light path which is turned through 90° by a curved reflective surface; however, it would be evident to a skilled person that a simple 45°-inclined mirror would also be suitable for such a task (cf. claim 9).

- 8 It is known in the art to use sloping surfaces to position the ends of optical fibers (cf. claim 10).
- 9 Claims 11, 13 & 14 recite obvious and/or known design options for connectors in this art.
- 10 The flat rectangular prismatic shape of the connector of US-a-5 345 527 enables such connectors to be stacked in a pile (cf. claim 12).

Section VII.

The description has not been brought into conformity with any amended claims as required by Rule 5.1(a)(iii) PCT.

Section VIII.

The description of the prior art is not clear in pages 2 - 5 and should be revised clearly to distinguish what is prior art from what are embodiments of the invention.

CLAIMS

1. Optoelectronic connector comprising a package (1), an optical port (2), an electrical port (3), an optoelectronic circuit positioned in this package and connected to these two ports, the optoelectronic circuit comprising a bare control (5_7) and emission-detection (8) integrated circuit chip, an internal wall (29) of the package being provided with metallized connections (11), pads (10) of this integrated circuit being connected (12) directly to the metallized connections, characterized in that it comprises laser diodes (8) being transferred on the integrated circuit, this connector constituting a basic unit link.

2. Connector according to claim 1, characterized in that the laser diodes (8) are transferred (45) on the integrated circuit with a space (50) between these diodes equal to a space (21) between optical fiber terminations in the optical port.

3. Connector according to one of the claims 1 to 2, characterized in that the package is an MID type package with connection metallizations deposited in a cavity of this package, contact armorings of the electrical port of this connector being formed by one of these metallizations.

4. Connector according to claim 3, characterized in that the MID type package is made by means of a method with metallizations in two passes.

5. Connector according to one of the claims 3 to 4, characterized in that the package is connected to the integrated circuit by BGA type connections, wire bonding or anisotropic film technology.

6. Connector according to one of the claims 3 to 5, characterized in that the shielding of the package is of an MID type.

7. Connector according to one of the claims 1 to 6, characterized in that pads (10) of the integrated circuit are connected (12) directly to the metallized connections.

8. Connector according to one of the claims 1 to 7, characterized in that the laser diodes are Vcsel diodes, preferably of the GaAs type.

9. Connector according to one of the claims 1 to 8, characterized in that the optical port comprises an inclined mirror (19), preferably inclined at 45°.

10. Connector according to one of the claims 1 to 9, characterized in

that the optical port comprises a part (18) for positioning optical fiber terminations, this part abutting (23) a cant (24) of the integrated circuit.

- 5 11. Connector according to one of the claims 1 to 10, characterized in that the optical port comprises a limited access with two optical channels and in that the electrical port comprises contacts for electrical signals and contacts for a ground signal.

12. Connector according to one of the claims 1 to 11, characterized in that the package is a module and comprises means (27, 28) to be stacked on another package.

- 10 13. Connector according to one of the claims 1 to 12, characterized in that pads of the laser diodes are connected by connection wires directly to pads of the integrated circuit.

- 15 14. Connector according to one of the claims 1 to 13, characterized in that the optoelectronic circuit comprises means to carry out a conversion of the signals available at the optical port into signals available at the electrical port and/or vice versa.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

EXA 16 10 2000

To:

Cabinet Christian Schmit et
Associés
Attn. SCHMIT, Christian N.M.
8, place du Ponceau
F-95000 CERGY
FRANCE

Date of mailing
(day/month/year)

26/09/2000

Applicant's or agent's file reference

10122W0

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/EP 00/ 02747

International filing date (day/month/year)	
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02/03/2000

Applicant

FRAMATOME CONNECTORS INTERNATIONAL

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau.

If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Audrey Rummery

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.